

Claims

1. A method of handling the transmission of RLC PDUs from a Radio Access Network (RAN) of a mobile telecommunications system to User Equipment (UE), the
5 method comprising:
- at a Gateway (GW) of the UTRAN, segmenting RLC SDUs into RLC PDUs for transmission to one or more Base Stations (BSs) of a set of BSs belonging to a handover link set, and combining RLC PDUs received from one or more of those BSs into RLC SDUs for transmission to a core network of the system; and
- 10 at the or each said BS, buffering RLC PDUs received from the GW and or the UE, and implementing an ARQ mechanism at the or each BS to facilitate reliable transmission of RLC PDUs between the UE and the GW, the ARQ mechanism utilising ARQ status messages sent over the air interface, between the UE and the BS(s), in order to acknowledge successfully transmitted data packets and request retransmission of
15 unsuccessfully transmitted data packets.
2. A method according to claim 1, wherein a Packet Data Convergence Protocol (PDCP) sub-layer is located in the GW, and the RLC entity exchanges RLC SDUs (PDCP PDUs) with the PDCP sub-layer, whilst the PDCP sub-layer exchanges PDCP SDUs with the core network of the mobile telecommunications system.
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3. A method according to claim 1, wherein a flow control mechanism is implemented between the BSs and the GW in order to minimise the buffer sizes at the BSs and to reduce the need for retransmission of data between the GW and a new BS
25 when that new BS is added to the link set.
4. A method according to claim 3, wherein, for data transfer in the downlink direction, each BS notifies the GW of PDUs which it has successfully sent and in response the GW issues Status_Update messages to the BSs to cause them to update their sending windows.
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5. A method according to claim 3, wherein, for data transfer in the uplink direction, RLC PDUs successfully received by a BS are passed to the GW and, when the GW has successfully constructed an SDU, an appropriate Status_Update message is sent from

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the GW to the BSs of the handover link set to cause the BSs to discard all PDUs belonging to this SDU.

6. A method according to claim 1, wherein, in the downlink direction, RLC PDUs
5 are sent from a Base Station (BS) of the Radio Access Network (RAN) to a UE, and each said data packet has a sequence number, the method comprising implementing at the BS the ARQ mechanism for resending data packets erroneously received by the UE and, upon receipt of an ARQ status message from the UE, advancing a transmission window of the BS so that its lower region covers the packet having the lowest sequence
10 number for which an ARQ acknowledgement has not yet been received.
7. A method according to claim 1, wherein the GW communicates with a plurality of BSs of a soft handover (SHO) link set.
- 15 8. A method according to claim 7 , wherein, in the downlink direction, RLC PDUs are sent from a Base Station (BS) of the Radio Access Network (RAN) to a UE, and each said data packet has a sequence number, the method comprising implementing at the BS the ARQ mechanism for resending data packets erroneously received by the UE and, upon receipt of an ARQ status message from the UE, advancing a transmission
20 window of the BS so that its lower region covers the packet having the lowest sequence number for which an ARQ acknowledgement has not yet been received, and comprising exchanging ARQ status messages, successfully received over the air interface, between BSs of the SHO link set.
- 25 9. A method according to claim 8, wherein only one of the BSs of the SHO link set is transmitting to the UE.
10. A method according to claim 8, wherein in the downlink direction only one of the BSs of the SHO link set is transmitting to the UE but all other BSs seek to
30 synchronise their buffers with the transmission buffer of the transmitting BS.
11. A mobile telecommunications system comprising a UMTS Terrestrial Radio Access Network (UTRAN) and, located in the UTRAN:

a Gateway (GW) arranged to segment RLC SDUs into RLC PDUs for transmission to one or more Base Stations (BSs) of a set of BSs belonging to a handover link set, and to combine RLC PDUs received from one or more of those BSs into RLC SDUs for transmission to a core network of the system; and

- 5 a plurality of Base Stations (BS) arranged to form a soft handover link set for a given User Equipment (UE), each said BS being arranged to buffer RLC PDUs received from the GW and or the UE and to implement an ARQ mechanism at the or each BS to facilitate reliable transmission of RLC PDUs between the UE and the GW, the ARQ mechanism utilising ARQ status messages sent over the air interface, between the UE
 - 10 and the BS(s), in order to acknowledge successfully transmitted data packets and request retransmission of unsuccessfully transmitted data packets.
12. A Gateway for use in the system of claim 11.
- 15 13. A Base Station for use in the system of claim 11.